Interim Action Completion Report
Fenceline Area Soil Excavation
North Boeing Field
Seattle, Washington

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Prepared for

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LIST OF ABBREVIATIONS AND ACRONYMS

ARARs	Applicable or Relevant and Appropriate Requirements
BGS	Below Ground Surface
City	City of Seattle
COC	Chain-of-Custody
DHA	Duane Hartman & Associates, Inc.
DNS	Determination of Non-Significance
Ecology	Washington State Department of Ecology
EPA	U.S. Environmental Protection Agency
FAA	Federal Aviation Administration
GAC	Granular Activated Carbon
GTSP	Georgetown Steam Plant
IAL	Interim Action Level
KCIA	King County International Airport
KCIW	King County Industrial Waste
µg/L	Micrograms per Liter
µg/kg	Micrograms per Kilogram
$\mu g/m^3$	Micrograms per Cubic Meter
mg/kg	Milligrams per Kilogram
MTCA	Model Toxics Control Act
NAVD88	North American Vertical Datum of 1988
NBF	North Boeing Field
NGVD29	National Geodetic Vertical Datum of 1929
NRCES	NRC Environmental Services, Inc.
OSHA	Occupational Safety and Health Administration
PCB	Polychlorinated Biphenyl
PEL	Propulsion Engineering Labs
RL	Reporting Limit
SEPA	State Environmental Policy Act
SOP	Standard Operating Procedure
SWPPP	Stormwater Pollution Prevention Plan
TESC	Temporary Erosion and Sediment Control
TPH	Total Petroleum Hydrocarbons
TSCA	Toxic Substances Control Act
USCS	Unified Soil Classification System

1.0 INTRODUCTION

This report documents interim action soil excavation activities conducted in 2011 on property leased by The Boeing Company (Boeing) at North Boeing Field (NBF) in Seattle, Washington. NBF is located east of East Marginal Way South, adjacent to the King County International Airport (KCIA) and the City of Seattle (City) Georgetown Steam Plant (GTSP) (see Figure 1).

The NBF fenceline area is located along the NBF/GTSP boundary and within Boeing's Propulsion Engineering Labs (PEL) area at NBF. The NBF fenceline area interim action was conducted by Boeing in conjunction with the GTSP interim action conducted by the City. The NBF/GTSP interim action soil excavation activities were conducted as a collaborative effort by Boeing and the City under the City's contract with NRC Environmental Services, Inc. (NRCES) and a participation agreement between Boeing, the City, and King County.

NBF interim action activities and site restoration work summarized in this report were conducted between July 2011 and the second quarter of 2012 in accordance with the *Interim Action Work Plan, 2011 Fenceline Area Interim Action Soil Excavation, North Boeing Field, Seattle, Washington* (Work Plan, Landau Associates 2011a), which was approved by the Washington State Department of Ecology (Ecology 2011) and the U.S. Environmental Protection Agency (EPA 2011). The GTSP interim action is summarized in the City's work plan (Integral 2011), which was also approved by Ecology and the EPA. GTSP soil excavation and site restoration activities are documented in the City's interim action completion report (Integral 2012).

The primary objective of the NBF fenceline area interim action was to remove accessible soil that contained concentrations of polychlorinated biphenyls (PCBs) greater than the interim action level (IAL) approved by Ecology. The IALs for PCBs in soil were developed in the Work Plan and are summarized in Section 2.1 of this report.

The NBF fenceline excavation areas were identified based on the comprehensive data set for soil and groundwater in the fenceline area and soil data from samples collected by the City at the base of an interim action excavation along the NBF/GTSP fenceline conducted by the City in 2006 (Integral 2006). The PCB data set for soil and groundwater samples located within the fenceline area interim action excavation area is summarized in Section 2.2.

PCBs were present in soil at concentrations both greater than and less than 50 milligrams per kilogram (mg/kg). Removal of soil with PCB concentrations greater than or equal to 50 mg/kg is regulated by the EPA under the Toxic Substances Control Act (TSCA), and was conducted in accordance with TSCA under the requirements of the risk-based procedures for the cleanup and disposal of PCB remediation waste [40 CFR § 761.61(c)]. Soil with PCB concentrations less than 50 mg/kg, but greater than the IALs, was excavated in accordance with the Model Toxics Control Act (MTCA) as an interim action in accordance with NBF/GTSP Agreed Order No. DE 5685 (Ecology 2008).

1.1 TIMELINE OF EVENTS

A timeline of events, which includes major interim action activities related to the NBF fenceline area excavation, is provided below:

- July 2011
  - Mobilization of equipment (begins 7/11/11)
  - Site preparation
  - Wheel wash installation

- August 2011
  - "Concrete Pad" exploratory excavation
  - Continued site preparation
  - Existing utility capping/removal
  - Non-TSCA excavation in NBF fenceline area begins 8/29/11
  - TSCA soil decant cell construction

- September 2011
  - TSCA excavation in NBF fenceline area begins 9/1/11
  - TSCA/non-TSCA excavation and backfilling continues throughout month

- October 2011
  - TSCA/non-TSCA excavation and backfilling continues
  - Oil/water separator OWS-186 removed on 10/13/11
  - Structural shoring installed (10/20/11-10/22/11)

- November 2011
  - Structural shoring removed (11/4/11)
  - Cleaning and demobilization of shoring equipment
  - Site grading

- December 2011
  - Continued site grading
  - Non-TSCA excavation around CB187A (12/7/11)
  - Site grading, irrigation installation, topsoil spread
  - Fire hydrant water supply line replaced (12/13/11)
  - Demobilization of equipment, trailers, wheel wash

- January 2012
  - Permanent fence reinstalled
  - Final demobilization of NRCES equipment
  - CB187A reset

- February 2012 – July 2012
  - High pressure air line reinstallation and site paving completed in July 2012.

2.0 SOIL EXCAVATION PLAN

This section summarizes development of the IALs, identification of the soil excavation areas, coordination with the City, and permits, approvals, and notifications associated with the NBF fenceline area interim action.

2.1 INTERIM ACTION LEVELS

IALs for PCBs were developed as described in detail in Section 2.1 of the Work Plan. Soil and groundwater PCB IALs developed for the fenceline area excavation are summarized below:

- **PCBs in Soil:** Separate IALs for PCBs were developed for soil in areas where PCBs are not present in groundwater [based on the lowest direct contact Applicable or Relevant and Appropriate Requirements (ARARs)], the TSCA cleanup level for bulk PCB remediation waste in high occupancy areas) and for soil in areas where PCBs are present in groundwater (based on the lowest direct contact ARAR and the site-specific soil concentration threshold protective of groundwater). The IALs for PCBs in soil are:
  - 1.0 mg/kg for total PCBs in soil in areas where PCBs are not detected in groundwater.
  - 0.5 mg/kg for total PCBs in soil in areas where PCBs are detected in groundwater.

  Groundwater monitoring wells NGW501, NGW502, NGW503, NGW504, and NGW507, all located within the fenceline excavation area, were previously found to contain total PCBs ranging from 0.032 micrograms per liter (µg/L) to 8.1 µg/L. Therefore, a soil IAL of 0.5 mg/kg was used for fenceline area soil excavations due to the detections of PCBs in groundwater at the five wells listed above.
- **PCBs in Groundwater:** The groundwater IAL for PCBs was developed from the groundwater and surface water ARARs as shown in Table C-2 of Appendix C of the Work Plan. The groundwater IAL for PCBs was less than the reporting limit (RL); therefore the groundwater IAL for PCBs was adjusted upward to the RL in accordance with MTCA [Washington Administrative Code (WAC) 173-340-720(7)(c)]. The IAL for groundwater is:
  - 0.01 µg/L for total PCBs in groundwater.

An IAL for total petroleum hydrocarbons (TPH) in soil was also developed in the Work Plan due to detections of these constituents in the GTSP fuel tank area. The soil IAL for TPH developed by the City for use in the GTSP fuel tank area, 3,000 mg/kg, was to be used at NBF should TPH contamination be identified during pre-excavation confirmation sampling along the fenceline adjacent to the GTSP fuel tank area. Pre-excavation confirmation samples were collected in May 2011 from six exploration locations adjacent to the GTSP fuel tank area (IAFE-S19 through IAFE-S24), as shown on Figure 2. These samples were analyzed and reported as non-detect for TPH and PCBs, as summarized on Figure 2 and in Table 1. Based on these results, the GTSP fuel tank excavation area was not extended onto NBF property. No other significant levels of petroleum hydrocarbons were identified in the NBF excavation areas.

2.2 IDENTIFICATION OF INTERIM ACTION EXCAVATION AREAS

The interim action excavation areas were identified based on comparison of IALs with the comprehensive set of soil and groundwater results collected in the NBF fenceline area and soil data from the base of the City's 2006 interim action excavation along NBF/GTSP fenceline (Integral 2006). In addition to the historical soil data collected in the area (1997 to 2008), more recent soil and groundwater characterization activities that aided in the determination of the NBF excavation areas included the 2010 *Focused Soil Investigation* (Landau Associates 2010) and the PEL soil and groundwater investigation conducted in 2010 and 2011 (Landau Associates 2011b). The soil data set for these investigations for PCBs and TPH is provided in Appendix A of the Work Plan, and groundwater PCB and TPH results are provided in Appendix B of the Work Plan. These PCB data are summarized on Figure 3 (modified from Figure 4 of the Work Plan). Additional analytical results for pre-excavation confirmation sampling conducted in May 2011 became available after preparation of the Work Plan; these data are summarized on Figures 2 and 4 and in Table 1.

The resulting comprehensive soil data set was compared with the IALs and used to develop the design for the NBF excavation areas and depths shown on Sheet 9 of the NBF/GTSP interim action construction drawings provided in Appendix A. The PCB results for soil present within the fenceline area were used to delineate the TSCA and non-TSCA soil excavation areas. The TSCA soil excavation areas and depths were identified based on the presence of soil with PCB concentrations greater than or equal to 50 mg/kg. The non-TSCA soil excavation areas and depths were identified based on the presence of soil with PCB concentrations less than 50 mg/kg and above the IAL. The NBF soil excavation areas were designed to extend as close as practicable to the existing storm drain system that needed to be protected and remain in place along the southern and western edges of the excavation areas (see Figures 3 and 4).

The NBF/GTSP interim action was designed and constructed based on elevations referenced to North American Vertical Datum of 1988 (NAVD88), rather than the National Geodetic Vertical Datum of 1929 (NGVD29) that is commonly used by Boeing for facilities in the NBF area. To convert project elevation data based on the NAVD88 datum to the NGVD29 datum, subtract 3.39 ft.

2.3 COORDINATION WITH CITY OF SEATTLE

The NBF fenceline area interim action was planned and conducted by Boeing in conjunction with the GTSP interim action conducted by the City. The NBF/GTSP interim action soil excavation activities were implemented as a collaborative effort by Boeing and the City under the City's contract with NRCES and a participation agreement between Boeing, the City, and King County.

Boeing and the City jointly planned the NBF/GTSP interim action, prepared the construction drawings and specifications, and provided oversight of NRCES' remedial construction activities. Common construction office and equipment staging areas, site access and truck haul routes, temporary erosion and sediment control (TESC) features, personnel and equipment decontamination facilities, automated wheel wash unit, and site security fencing were used throughout the project duration. Coordination with the City also included collaborative use of a TSCA decant cell for temporary storage and dewatering of TSCA-regulated soil, and a temporary water treatment system to pre-treat extracted groundwater and construction water in accordance with TSCA and King County requirements prior to discharge to the King County sanitary sewer system. The locations of certain common construction features (including the site access/haul route, wheel wash facility, TSCA decant cell, and temporary water treatment system) are shown on Figure 5.

2.4 PERMITS, APPROVALS, AND NOTIFICATIONS

In addition to Ecology and EPA review and approval of the Work Plan, other local, state, and federal approvals, notifications, or permits that applied to implementation of the NBF/GTSP interim action project included (provided in Appendix B):

- Chapter 197-11 WAC. A State Environmental Policy Act (SEPA) checklist was prepared and submitted to the City. Seattle City Light, the lead agency for the proposal, issued a Determination of Non-Significance (DNS) for the NBF/GTSP interim action project on June 13, 2011.
- 14 CFR §77.13. Federal Aviation Administration (FAA) Form 7460-1, notifying the FAA of planned used of a construction crane that would extend into federal approach/departure surfaces, was prepared and submitted to KCIA, who forwarded the document to the FAA. The FAA issued its final determination letter to KCIA on August 22, 2011.
- King County Industrial Waste (KCIW) Program. A construction dewatering request form, including details for the temporary water treatment system based on chitosan enhanced sand filtration and granular activated carbon (GAC), was prepared and submitted to the KCIW Program to request approval to discharge treated water from multiple projects at NBF during the 2011 construction season to the King County sanitary sewer system. The KCIW Program issued its Major Discharge Authorization No. 827-01 on June 30, 2011.
- Stormwater Pollution Prevention Plan (SWPPP). Although Ecology determined that a Construction Stormwater General Permit was not required for the NBF/GTSP interim action, a project-specific SWPPP was prepared on July 18, 2011 and provided to NRCES to implement and maintain for the duration of the project. The SWPPP described how stormwater management during interim action construction activities would comply with substantive requirements of Ecology's Construction Stormwater General Permit and the City's Construction Stormwater Control Plan.

3.0 SOIL EXCAVATION AND DISPOSAL

The NBF fenceline area interim action soil excavation areas and depths are summarized on Figure 6 and shown in detail on Sheet 9 of the construction drawings in Appendix A. The soil excavation areas include both: 1) areas where soil with total PCB concentrations greater than or equal to 50 mg/kg was excavated in accordance with TSCA requirements, and 2) areas where soil with total PCB concentrations less than 50 mg/kg was excavated in accordance with MTCA requirements and the NBF/GTSP Agreed Order. Soil excavation and disposal activities were conducted in accordance with the Work Plan (Landau Associates 2011a), which was approved by Ecology (2011) and the EPA (2011).

Prior to the start of interim action construction activities, groundwater monitoring wells within the excavation areas (NGW501, NGW502, NGW503, NGW504, and NGW507) were decommissioned in accordance with WAC-173-160-460.

Boeing representatives involved in interim action field activities followed the health and safety plan provided in Appendix D of the Work Plan. Contractor representatives followed the site-specific health and safety plan for the NBF/GTSP interim action project that was prepared by NRCES.

NRCES mobilized to the site in mid-July 2011 and installed temporary site security fencing; TESC features (including catch basin inserts, stormwater diversion berms, and stormwater collection sumps); stabilized haul roads; decontamination facilities; the automated wheel wash unit; and other temporary construction facilities. Clearwater Services had previously installed the temporary water treatment system for use on several of Boeing's 2011 construction projects at NBF. NRCES began soil excavation within non-TSCA areas in August 2011. Surficial pavement materials within the NBF fenceline area were removed as required to allow access to the underlying soil excavation areas, and the pavement materials were demolished and disposed as solid waste. Construction of the TSCA decant cell was completed in late-August and NRCES began soil excavation within TSCA areas in early September 2011. NRCES completed most of the fenceline area interim action activities summarized in this report by the end of December 2011, with minor soil excavation, equipment demobilization, and site restoration activities continuing into 2012.

Interim action confirmation sampling results include data collected both prior to and during soil excavation activities. Confirmation sample data collected during excavation activities are presented on Figure 4, which includes data for both soil removed and soil remaining in place. Soil excavation depths and soil sample locations representing soil remaining in place within the limits of the interim action excavation areas are shown on Figure 6.

Soil excavation activities, field documentation, confirmation sample collection, chemical analysis, equipment decontamination, and waste disposal for the excavation of TSCA-regulated soil and soil regulated under MTCA are further described in Sections 3.1 and 3.2, respectively. Interim action

excavation construction record and progress survey drawings prepared by the project surveyor are included in Appendix C. Selected photographs showing various interim action construction activities are included in Appendix D.

3.1 SOIL WITH PCBS GREATER THAN OR EQUAL TO 50 MG/KG

Soil with total PCB concentrations greater than or equal to 50 mg/kg (TSCA soil) was excavated, handled, and disposed as TSCA waste. TSCA soil was removed and disposed at a properly permitted hazardous waste (Subtitle C) landfill in accordance with TSCA risk-based cleanup and disposal procedures [40 CFR § 761.61(c). TSCA soil was managed separately from non-TSCA soil with total PCB concentrations less than 50 mg/kg.

The TSCA soil excavation areas and depths identified on the interim action construction drawings were based on the evaluations summarized in Section 2.2. The TSCA soil excavations included the narrow excavation area in the alley along the west side of the fenceline and the larger excavation area south of the fenceline near Building 3-326, as shown on Figures 3 and 4. Figure 4 shows the TSCA soil excavation area confirmation sample locations and PCB results (including samples representing depths of excavated soil). TSCA soil excavation areas, depths, and confirmation samples representing soil remaining in place at the base of the excavations are presented on Figure 6. Soil confirmation sample data are presented in Table 1.

TSCA soil excavations along the alley were typically completed as sequenced open cuts that sloped down from the base of the temporary diversion berm installed along the storm drain system and extended to approximately 5 to 8 ft below ground surface (BGS) near the NBF/GTSP property line. Steel sheeting was installed along portions of the alley excavations to help stabilize excavation sidewalls and separate clean backfill from unexcavated soil.

TSCA soil excavations in the area south of the fenceline included removal of abandoned oil/water separator OWS186 (an existing 5,000-gallon steel tank that had previously been abandoned in-place and filled with a lean concrete grout), as well as removal of pea gravel used as backfill after the 1986 removal of underground storage tank UBF-27 formerly located east of OWS186. OWS186 was demolished and removed, the pea gravel was excavated along with adjacent TSCA soil, and these materials were disposed as TSCA waste. These features are shown on Figure 6.

TSCA soil excavations in the area south of the fenceline was typically completed within shored excavation cells in order to extend the excavations down to approximately 7 to 10 ft BGS adjacent to the storm drain system and protect the Building 3-326 foundation and adjacent facilities. The perimeter of this TSCA soil excavation area was shored with a steel beam and sheet lagging system installed with a crane-mounted vibratory hammer, and internal cells were supported by steel sheeting and beams.

Due to relatively shallow groundwater conditions at the time the TSCA soil excavations were conducted, the deeper portions of the excavations extended below the groundwater level. While some partial excavation dewatering was conducted, most of the TSCA soil was removed by sequential excavation below water level to elevations that met or exceeded planned excavation depths, followed by placement of granular backfill material, as needed, to stabilize the base and sidewalls of the excavation area.

The TSCA excavation areas were backfilled to pavement subgrade level with 2-inch minus crushed rock (sandy gravel) obtained from Washington Rock Quarries' Kapowsin Quarry. Chemical analyses of the material were conducted by the City to demonstrate that it had suitable chemical characteristics for use as excavation backfill, as discussed further in Section 3.4.

Certain underground utilities within the TSCA soil excavation areas were removed to facilitate soil excavation activities, as discussed in Section 3.5. The associated sections of the utility pipes/conduits were demolished and removed, and the materials were disposed as TSCA waste. Some lateral movement of storm drain catch basin CB-187A during adjacent soil excavation required that this catch basin be reset, as discussed in Section 3.5. Excavation dewatering and construction water management are discussed further in Section 3.6.

3.1.1 MANAGEMENT AND DISPOSAL OF EXCAVATED SOIL

As required in EPA's approval of the Work Plan, a temporary TSCA decant cell was constructed by NRCES at the approximate location shown on Figure 5. The TSCA decant cell was designed and used for multiple purposes, including removal of free liquids from TSCA soil, temporary storage of TSCA-regulated materials prior to loading for disposal, and decontamination of equipment and excavation shoring materials used for TSCA soil excavation. The TSCA decant cell was approximately 20 ft by 40 ft in plan dimension and contained within a perimeter berm constructed with ecology blocks stacked two high. The soil subgrade was graded to slope to an internal dewatering sump installed in one corner of the cell and covered with a non-woven geotextile cushion. A 30-mil polyvinyl chloride geomembrane was installed over the base and perimeter berm to serve as the primary liner, and a bonded geocomposite (geotextile/geonet/geotextile) layer was installed over the geomembrane to facilitate drainage to the sump and protect the geosynthetic liner. Steel plates were placed on the floor of the cell to serve as a durable working surface.

TSCA soil excavations were conducted by NRCES personnel using a combination of excavators, loaders, and other equipment supplemented with certain hand tools, and all TSCA wastes were placed in the decant cell prior to loading for disposal. As excavations extended below groundwater level, excavated soil was temporarily placed at a higher elevation within the excavation and allowed to drain back into the excavation, and then was placed in the TSCA decant cell to remove any remaining free

liquids. TSCA waste materials were subsequently transferred to lined trucks and transported for disposal under Boeing hazardous waste manifests at the Waste Management NW chemical waste landfill in Arlington, Oregon that is permitted to accept TSCA waste under 40 CFR § 761.75.

Based on weight receipts, approximately 1,150 tons of soil and debris were removed from the fenceline area excavations and disposed as TSCA waste. It is estimated that this corresponds to approximately 785 cubic yards (inplace volume) of material disposed as TSCA waste. These TSCA waste weight/volume estimates include approximately 35 cubic yards/50 tons of soil from adjacent GTSP TSCA excavation areas that were comingled in the decant cell and transported for disposal under Boeing hazardous waste manifests.

3.1.2 CONFIRMATION SAMPLE COLLECTION PROCEDURES

Confirmation samples include samples collected in the fenceline excavation area during previous sampling events, samples collected during the pre-excavation soil sampling activities that took place in May 2011, and samples collected during the excavation. Available soil data were used during design to define the vertical extent of the TSCA soil excavations and limit the number of samples required to be collected during excavation of soil beneath the groundwater level. Confirmation sample locations and PCB data are presented on Figure 4 (including samples representing excavated soil). Confirmation soil samples representing soil remaining in place at the base of the excavations are presented on Figure 6.

Confirmation soil samples were collected using a clean, stainless steel spoon and were homogenized in a stainless steel bowl. All soil samples were placed into 8-ounce glass sample jars, labeled, and stored on ice.

3.1.3 RECORDKEEPING

A complete record of significant field activities was maintained. Recordkeeping conformed to 40 CFR § 761.61(a)(9) and 40 CFR§ 761.125(c)(5) requirements. Documentation included field logbooks, field sampling forms, photographs, sample labels, and chain-of-custody (COC) forms. Field logbooks were used to record pertinent interim action soil removal activities. Sample possession and handling was documented so that the sample is traceable from the time of sample collection, to the laboratory, and through data analysis.

3.1.4 EQUIPMENT DECONTAMINATION

Equipment used for soil excavation and handling that contacted TSCA-regulated material was decontaminated using solvent soap washing techniques and/or wipe sampled in accordance with the decontamination procedures required under 40 CFR § 761.79, or was discarded as TSCA waste and disposed in the same manner as TSCA-regulated soil. Liquid wastes generated during equipment

decontamination were pumped to the temporary onsite water treatment facility, which is discussed in Section 3.6.

3.2 SOIL WITH PCBS LESS THAN 50 MG/KG

Soil with total PCB concentrations less than 50 mg/kg and greater than the 0.5 mg/kg IAL (non-TSCA soil) was managed separately from TSCA-regulated soil. Non-TSCA soil was excavated, handled, and disposed at a permitted Subtitle D solid waste landfill in accordance with MTCA requirements.

The non-TSCA soil excavation areas and depths identified on the interim action construction drawings were based on the evaluations summarized in Section 2.2. The non-TSCA soil excavations included the narrow excavation area in the alley along the west side of the fenceline, an excavation area in the southwest corner of the fenceline area, a small excavation area west of Building 3-326 and south of the adjacent pipe support bridge, and the larger excavation area south of the fenceline and east of Building 3-326, as shown on Figures 3 and 4. Figure 4 shows the non-TSCA soil excavation area confirmation sample locations and PCB results (including samples representing depths of excavated soil). Non-TSCA soil excavation areas, depths, and confirmation samples representing soil remaining in place at the base of the excavations are presented on Figure 6. Soil confirmation sample data are presented in Table 1.

The small non-TSCA soil excavation at the former location of groundwater monitoring well NGW503, situated west of Building 3-326 and south of the adjacent pipe support bridge, was conducted by Glacier Environmental as an open cut to 2 ft BGS. This small area was excavated, backfilled, and repaved by Glacier Environmental prior to the start of NRCES's implementation of the NBF/GTSP interim action project.

The non-TSCA soil excavation area along the alley was completed as an open cut that sloped down from the base of the temporary diversion berm installed along the storm drain system and extended to approximately 5 to 6 ft BGS near the NBF/GTSP property line.

The non-TSCA soil excavation area in the southwest corner of the fenceline area included a deeper area completed within excavation cells shored with steel sheeting and beams in order to extend the excavations down to approximately 7 to 10 ft BGS adjacent to the storm drain system. This non-TSCA soil area also included shallower excavations south of the storm drain system that were completed as open cuts that extended to approximately 3 to 4 ft BGS.

The non-TSCA soil excavation area south of the fenceline and east of Building 3-326 included a deeper area completed within excavation cells shored with steel sheeting and beams in order to extend the excavation down to approximately 7 ft BGS adjacent to the storm drain system and near the corner of the building. This non-TSCA soil area also included shallower excavations east of Building 3-326 that were completed as open cuts that extended to approximately 3 to 4 ft BGS. Previous sampling events had

identified what was assumed to be a buried concrete slab at approximately 2 ft BGS in the areas of LAI-SB40, LAI-SB41, SB22, SB08, LAI-SB37, and LAI-SB39 (see Figure 3). Excavation activities revealed the buried obstruction to be an asphalt-like material. One confirmation sample was collected from the material [CONFIRM-1(2.0-2.5)]. PCBs were not detected and TPH concentrations were below the IAL established in Section 2.1. This material was excavated and disposed as solid waste. The PCB concentrations in the confirmation soil samples collected beneath the asphalt-like material [CONFIRM-1(2.5-3.0), IAFE-C03-B, IAFE-C04-B, and IAFE-C05-B] were non-detect or below the soil IAL, and additional excavation in this area was not conducted. PCB data for CONFIRM-1(2.0-2.5), CONFIRM-1(2.5-3.0), IAFE-C03-B, IAFE-C04-B, and IAFE-C05-B are presented on Figure 4 and in Table 1; TPH results for CONFIRM-1(2.0-2.5) are presented in Table 1.

Due to relatively shallow groundwater conditions at the time the non-TSCA soil excavations were conducted, the deeper portions of the excavations extended below the groundwater level. While some partial excavation dewatering was conducted, most of the non-TSCA soil was removed by sequential excavation below water level to elevations that met or exceeded planned excavation depths, followed by placement of granular backfill material, as needed, to stabilize the base and sidewalls of the excavation area.

The non-TSCA excavation areas were backfilled to pavement subgrade level with 2-inch minus crushed rock (sandy gravel) obtained from Washington Rock Quarries' Kapowsin Quarry. Chemical analyses of the material were conducted by the City to demonstrate that it had suitable chemical characteristics for use as excavation backfill, as discussed further in Section 3.4.

Certain underground utilities within the non-TSCA soil excavation areas were removed to facilitate soil excavation activities, as discussed in Section 3.5. The associated sections of the utility pipes/conduits were demolished and removed, and the materials were disposed as solid waste. Excavation dewatering and groundwater management are discussed further in Section 3.6.

3.2.1 MANAGEMENT AND DISPOSAL OF EXCAVATED SOIL

Non-TSCA soil excavations were primarily conducted by NRCES personnel using a combination of excavators, loaders, and other equipment supplemented with certain hand tools. As excavations extended below groundwater level, excavated soil was temporarily placed at a higher elevation within the excavation and allowed to drain back into the excavation. The excavated soil and debris was then placed in temporary stockpiles until subsequently transferred to trucks and transported to the Waste Management Alaska Street transfer station for shipment to the Columbia Ridge Landfill in Arlington, Oregon, a facility licensed or registered to manage municipal solid waste subject to 40 CFR Part 258 or non-municipal non-hazardous waste subject to 40 CFR §§257.5 through 257.30, as applicable for disposal.

Based on weight receipts and survey data, it is estimated that approximately 990 tons of non-TSCA soil and debris (corresponding to an inplace volume of approximately 670 cubic yards of material) were removed from the NBF fenceline area excavations and disposed as solid waste at the Columbia Ridge Landfill.

3.2.2 CONFIRMATION SAMPLE COLLECTION PROCEDURES

Confirmation samples include samples collected in the fenceline excavation area during previous sampling events, samples collected during the pre-excavation soil sampling activities that took place in May 2011, and samples collected during the excavation. Available data were used during design to define the vertical extent of the non-TSCA soil excavations and limit the number of samples required to be collected during excavation of soil beneath the groundwater level. Confirmation sample locations and PCB data are presented on Figure 4 (including samples representing excavated soil). Confirmation soil samples representing soil remaining in place at the base of the excavations are presented on Figure 6. Confirmation soil sample results were compared directly to the IAL. All confirmation sample results representing soil remaining in place were less than the established IAL for PCBs in soil.

Confirmation soil samples were collected using a clean, stainless-steel spoon and were homogenized in a stainless-steel bowl. All soil samples were placed into 8-ounce glass sample jars, labeled, and stored on ice.

3.2.3 RECORDKEEPING

A complete record of significant field activities was maintained. Documentation included field logbooks, field sampling forms, photographs, sample labels, and COC forms. Field logbooks were used to record pertinent interim action soil removal activities. Sample possession and handling was documented so that samples are traceable from the time of sample collection, to the laboratory, and through data analysis.

3.2.4 EQUIPMENT DECONTAMINATION

Given the proximity of the TSCA and non-TSCA excavation areas, all equipment was decontaminated as described in Section 3.1.4, in accordance with the procedures required under 40 CFR § 761.79. Equipment decontamination was performed in the TSCA decant cell, and all solid wastes generated during decontamination were disposed in the same manner as TSCA-regulated soil. Liquid wastes generated during equipment decontamination were pumped to the temporary onsite water treatment facility, which is discussed in Section 3.6.

3.3 AIR PROTECTION MEASURES AND SAMPLING

Air protection measures were implemented during the interim action excavation activities due to the presence of Boeing personnel-occupied buildings adjacent to the excavation areas. NRCES implemented a dust suppression plan to reduce the potential for migration of contaminated dust and debris during excavation activities. Air quality samples were also collected to characterize breathing-zone conditions in the immediate vicinity of excavation activities.

Air quality samples were collected during 2 days while excavation activities were underway. Two samples, identified as OAQ-EXC-01 and OAQ-EXC-02, were collected at a flow rate of 5 liters per minute over an 8-hour period on September 1, 2011. Weather conditions were sunny, with no precipitation and a maximum temperature of approximately 73 degrees. Another two samples, identified as OAQ-EXC-03 and OAQ-EXC-04, were collected at a flow rate of 5 liters per minute over an 8-hour period on September 6, 2011. Weather conditions were sunny, with no precipitation and a maximum temperature of approximately 84 degrees. All samples were collected from a height of 3 ft above ground surface. The sample height is a conservative representation of the breathing zone because work activities typically generated dust at or below the ground surface.

Samples OAQ-EXC-01 and OAQ-EXC-04 were located outside the exclusion zone; samples OAQ-EXC-02 and OAQ-EXC-03 were located inside the exclusion zone, adjacent to the excavation area. The air quality sample locations are shown on Figure 7. PCBs were not detected in any of the four samples. Sample results are provided on Figure 7 and in Table 2.

3.4 CHEMICAL ANALYSES

Confirmation soil samples were transported to Boeing's contract laboratory, ARI, in Tukwila, Washington, within 24 hours of sample collection. All samples were analyzed for PCB Aroclors by EPA Method 8082 in accordance with 40 CFR § 761.272 or gasoline-range and diesel-range total petroleum hydrocarbons by NWTPH-Gx and NWTPH-Dx. Soil samples analyzed for PCBs were extracted by EPA Method 3546. The reporting limit for PCB Aroclors in soil was 32 micrograms per kilogram (µg/kg). PCB and TPH data for confirmation soil samples are presented in Table 1. Laboratory data packages for soil confirmation samples are provided in Appendix E. Sample preparation procedures, extraction procedures, and instrumental/chemical analysis procedures used are described in ARI's standard operating procedures (SOPs) SOP 350S and SOP 403S, which are available from ARI on request.

Air samples were transported to and analyzed by Columbia Analytical Services in Kelso, Washington. Air samples were analyzed for PCBs using EPA Method TO-10A. The laboratory reporting limit for PCBs in air was 0.21 $\mu g/m^3$ for each aroclor. PCB data for air samples are presented in Table 2. Laboratory data packages for air samples are provided in Appendix F.

The fenceline area excavations were backfilled with 2-inch minus crushed rock obtained from Washington Rock Quarries' Kapowsin Quarry; grain size and compaction test results for the backfill material are included in Appendix G. Chemical analyses of the material were conducted by the City to demonstrate that it had suitable chemical characteristics for use as excavation backfill within the NBF/GTSP interim action areas. The results of the chemical analyses on the excavation backfill material are provided in Appendix G.

3.5 UTILITIES AND OTHER EXCAVATION CONSTRAINTS

The presence of buildings, utilities, and other infrastructure in the NBF fenceline area constrained the extent and depth of the 2011 interim action excavations. The interim action excavation areas were not expanded or deepened where doing so could have endangered the integrity of existing building foundations, critical utilities, or other infrastructure adjacent to the excavation areas. The only significant adjustment to the extent of the excavation areas shown on the interim action construction drawings occurred along the east side of Building 3-326, where the shallow non-TSCA soil excavation that was planned to extend to the side of the building was terminated approximately 3 ft to the east in order to protect the building foundations in that area.

No buildings or essential equipment were demolished or removed as part of the soil excavation activities described in this report. However, certain utilities present within the interim action area were temporarily removed to facilitate soil excavation activities. Segments of the high-pressure air line, the Puget Sound Energy natural gas line, and the water supply line to NBF fire hydrant No. 340 were temporarily removed during excavation activities. The fire hydrant water supply line was re-installed by Glacier Environmental personnel during excavation backfilling and grading activities. The equipment that required connection to the natural gas line is no longer in use and, therefore, the natural gas line will not be reinstalled. It is currently anticipated that the high-pressure air line will be reinstalled by a Boeing contractor in the spring of 2012.

The storm drain system located adjacent to the excavation areas remained in place during excavation activities. All storm drain inlets in the vicinity of the interim action excavation areas and truck haul routes were fitted with below inlet grate devices (catch basin inserts) to prevent construction soil and debris from entering the storm drain system. In addition, water-tight stormwater diversion berms were constructed along the storm drain line to prevent runoff from the excavation areas from entering the storm drain system.

Movement of the temporary shoring supporting the deep excavation just north of storm drain catch basin CB-187A (where soil below former oil/water separator OWS186 was removed down to about 10 ft BGS) resulted in some northward lateral movement of CB-187A. Following completion of soil removal and excavation backfilling in the area, Glacier Environmental replaced the storm drain segment

connecting SDMH-187 and CB-187A and reset the catch basin to its former location. Other catch basins on the east side of Building 3-326 are in the process of being relocated and/or replaced to accommodate the reinstallation of the air line.

3.6 DEWATERING AND CONSTRUCTION WATER MANAGEMENT

As discussed in Sections 3.1 and 3.2, relatively shallow groundwater conditions at the time the fenceline area soil excavations were conducted resulted in a significant portion of the excavations extending below the groundwater level. Partial excavation dewatering within open cut and shored excavations was conducted to the extent practicable to facilitate soil removal and excavation backfilling activities. Temporary shoring and sheeting systems were used as a means to help control groundwater flow into certain excavation areas and protect adjacent facilities and utilities.

Extracted groundwater and construction water (including stormwater runoff within the temporary diversion berms that was not infiltrated) was contained and conveyed to the temporary onsite water treatment facility for pre-treatment prior to discharge to the King County sanitary sewer system. The temporary water treatment facility was designed and operated to achieve King County discharge limits associated with Major Discharge Authorization No. 827-01 and meet TSCA requirements.

3.7 SITE RESTORATION

New security fencing meeting Boeing requirements was installed along the NBF/GTSP property line in January 2012 to replace the portions of the security fence that were removed to facilitate the NBF/GTSP interim action excavations.

As previously discussed, the soil excavation areas were backfilled to approximate pavement subgrade level with 2-inch minus crushed rock. After the high-pressure air line is reinstalled down the alley and over to the east side of Building 3-326, the excavation areas will be regraded and repaved with hot mix asphalt pavement. It is also anticipated that an extruded curb will be installed on top of the pavement and adjacent to the security fencing along the NBF/GTSP property line.

4.0 COMPLIANCE

Compliance with the established soil IALs was demonstrated prior to backfilling of the NBF fenceline area interim action excavations. Confirmation sample results representing soil remaining in place within the limits of the fenceline area interim action excavations were less than the established IAL for PCBs in soil. Confirmation soil sample results were compared directly to the IAL described in Section 2.1. All known and accessible soil with PCBs greater than the IAL was removed during excavation activities. Confirmation samples representing soil remaining in place, and final excavation areas and depths, are shown on Figure 6.

The NBF fenceline area interim action excavations reached elevations that met or exceeded the planned excavation depths shown on Sheet 9 of the construction drawings (see Appendix A). Final excavation depths were confirmed by field measurements/observations and documented to the extent practicable by progress surveys conducted by the licensed project surveyor, Duane Hartman & Associates, Inc. (DHA). DHA's construction record and progress survey drawings are provided in Appendix C.

Five groundwater monitoring wells were decommissioned prior to excavation activities: NGW501, NGW502, NGW503, NGW504, and NGW507. As described in Section 2.1, PCBs were previously detected in groundwater samples from those five groundwater monitoring wells at concentrations ranging from 0.032 µg/L to 8.1 µg/L. A groundwater monitoring plan describing how compliance with the groundwater IAL will be demonstrated in the vicinity of the NBF fenceline area excavations is being submitted to Ecology as a separate document.

Compliance with the Occupational Safety and Health Administration (OSHA) permissible exposure limits was demonstrated during excavation activities. The OSHA permissible exposure limits for PCBs are as follows:

- Aroclor 1242: 1 mg/m^3
- Aroclor 1254: 0.5 mg/m^3

Air monitoring samples were non-detect for PCBs at reporting limits at least three orders of magnitude less than the OSHA permissible exposure limits. It was concluded that excavation activities did not appear to generate airborne PCB concentrations of concern for occupational exposure.

5.0 SUMMARY

As described in Section 1.0, the primary objective of the NBF fenceline area interim action soil excavation project was to remove accessible soil that contained concentrations of PCBs greater than the established IAL (0.5 mg/kg because PCBs were detected in groundwater), as required by Ecology. PCBs were present in soil at concentrations both greater than and less than 50 mg/kg. Removal of soil with PCB concentrations greater than or equal to 50 mg/kg was regulated by the EPA, and was conducted in accordance with TSCA under the requirements of the risk-based procedures for the cleanup and disposal of PCB remediation waste [40 CFR § 761.61(c)]. Soil with PCB concentrations less than 50 mg/kg, but greater than the IAL, was excavated in accordance with MTCA as an interim action in accordance with the NBF/GTSP Agreed Order (Ecology 2008). The fenceline area interim action work plan was approved by both the EPA under TSCA and Ecology under MTCA.

The extent and depth of the NBF soil excavation areas was determined based on the results of PCB soil data collected in the fenceline area during previous sampling events, samples collected during the pre-excavation soil sampling activities that took place in May 2011, and samples collected during soil excavation activities. In total, approximately 2,140 tons (an estimated 1,455 cubic yards) of soil and debris were excavated and disposed during the fenceline area soil excavation project. Approximately 1,150 tons (an estimated 785 cubic yards) of material were removed and disposed as TSCA waste at the Waste Management NW chemical waste landfill in Arlington, Oregon, as described in Section 3.1. Approximately 990 tons (an estimated 670 cubic yards) of non-TSCA material were removed and transported to the Waste Management Alaska Street transfer station for disposal as solid waste at the Columbia Ridge Landfill in Arlington, Oregon, as described in Section 3.2.

The presence of buildings, utilities, and other infrastructure in the NBF fenceline area constrained the extent and depth of the 2011 interim action excavations, and a significant portion of the excavations extended below the groundwater level. Temporary excavation shoring and sheeting systems were used in certain areas as a means to help protect adjacent structures/utilities and control groundwater flow into the excavations. Extracted groundwater and construction water was contained and pre-treated at the temporary onsite water treatment facility prior to discharge to the King County sanitary sewer system.

Compliance with the established soil IAL was demonstrated prior to backfilling of the excavation areas. Final excavation depths were confirmed by field measurements/observations and documented to the extent practicable by progress surveys conducted by a licensed surveyor. Confirmation soil samples representing soil remaining in place within the final excavation areas are shown on Figure 6. All known and accessible soil with PCBs greater than the IAL was removed within the limits of the fenceline area interim action excavations.

The NBF fenceline area excavations were backfilled with clean imported fill material and were repaved following reinstallation of the high-pressure air line, in July 2012.

6.0 USE OF THIS DOCUMENT

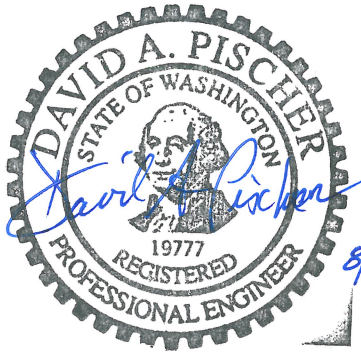
This interim action completion report has been prepared for the exclusive use of The Boeing Company and applicable regulatory agencies for specific application to the NBF fenceline area interim action soil excavation project. No other party is entitled to rely on the information included in this document without the express written consent of Landau Associates. Further, the reuse of information provided herein for extensions of the project or for any other project, without review and authorization by Landau Associates, shall be at the user's sole risk. Landau Associates warrants that within the limitations of scope, schedule, and budget, our services have been provided in a manner consistent with that level of care and skill ordinarily exercised by members of the profession currently practicing in the same locality under similar conditions as this project. We make no other warranty, either express or implied.

This report has been prepared under the supervision and direction of the following key staff. We hereby conclude that, to the best of our knowledge, the interim action construction activities summarized in this report have been satisfactorily completed in substantial compliance with the Interim Action Work Plan, the construction drawings and specifications, and other project related documents.

LANDAU ASSOCIATES, INC.

Kristy J. Hendrickson, P.E.
Principal

David A. Pischer, P.E.
Principal



8/23/2012

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Project Engineer

Dylan H. Frazer
Senior Staff Geologist

KJH/DAP/CMG/DHF/tam

7.0 REFERENCES

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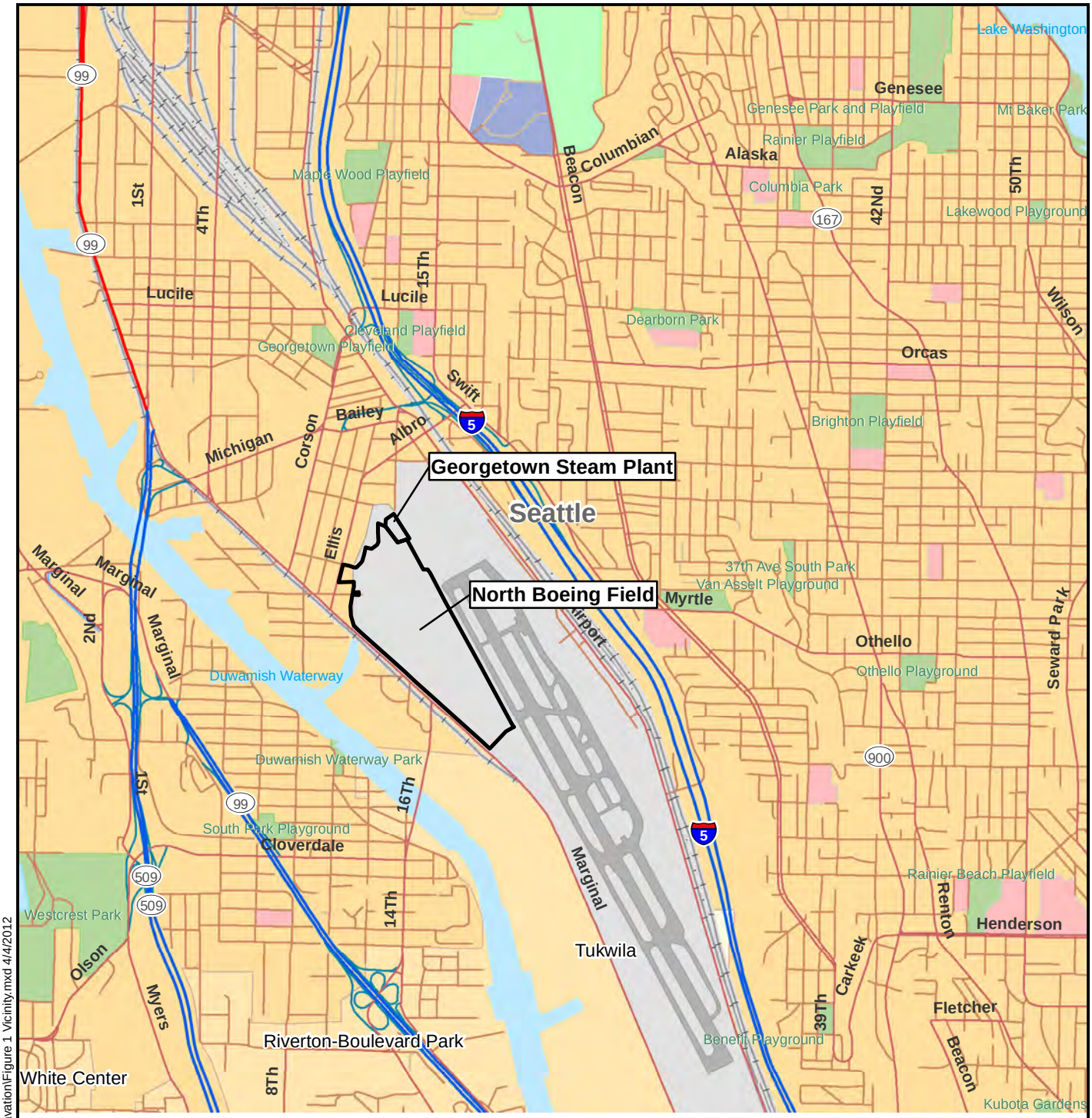

N

0 0.5 1

Miles

Data Source: ESRI 2008

Y:\Projects\025082\212.002\MapDocs\Fenceline Excavation\Figure 1 Vicinity.mxd 4/4/2012

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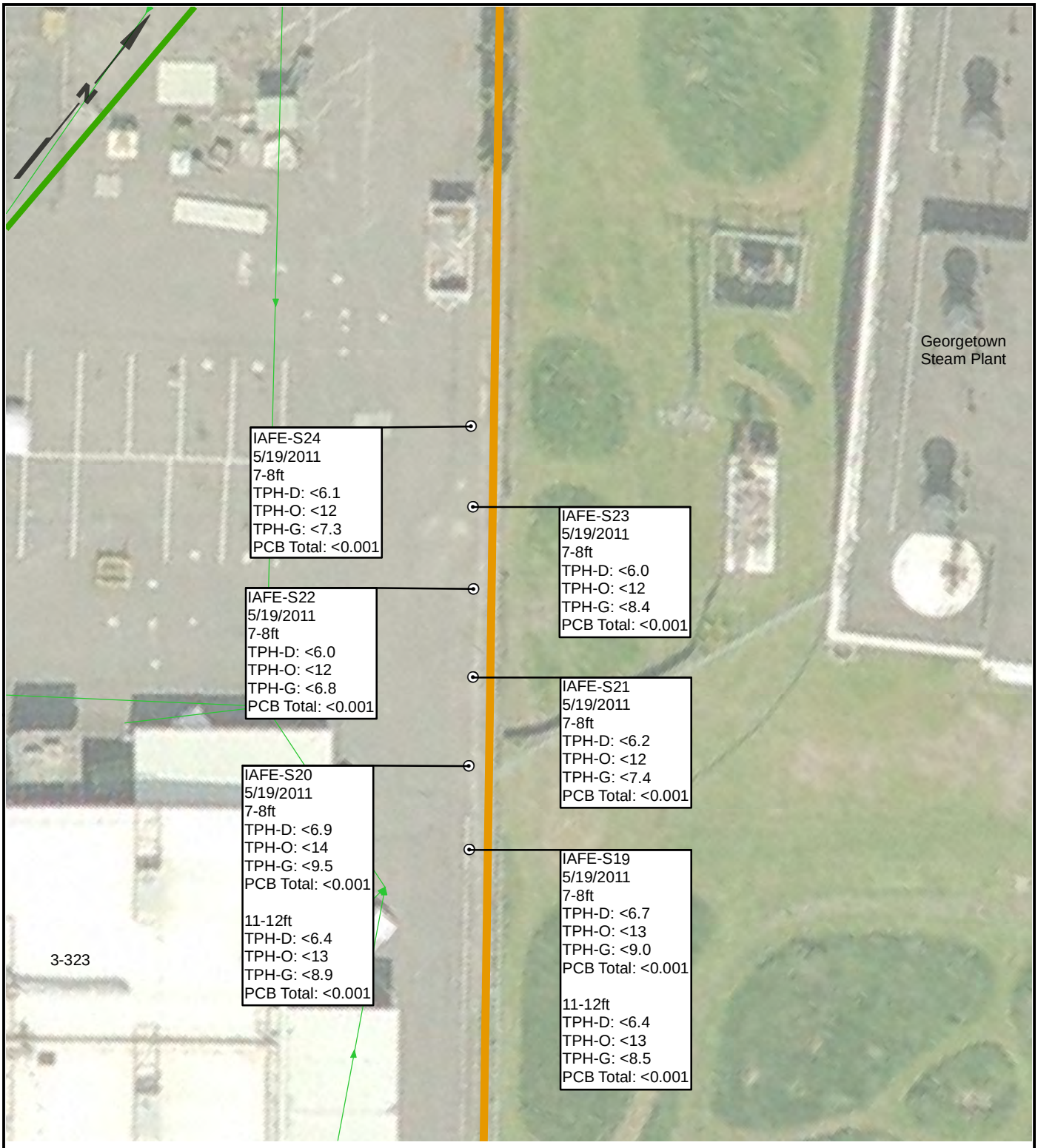
North Boeing Field Seattle, Washington	**Vicinity Map**	Figure 1



Legend

- IAFE Sample Locations
- North Lateral
- PEL Boundary
- Seattle City Light Property Boundary

IAFE-S24
5/19/2011
7-8ft
TPH-D: <6.1
TPH-O: <12
TPH-G: <7.3
PCB Total: <0.001

Sample ID
Date
Sample Depth
Concentrations Reported in mg/kg

Note

1. Black and white reproduction of this color original may reduce its effectiveness and lead to incorrect interpretation.

0 25 50

Scale in Feet

Y:\Projects\025082\212.005\MapDocs\Interim Action Fenceline Excavation Completion Report\Figure2GTSPFuelTankAreaTPHPCBs.mxd 8/15/2012 NAD 1983 StatePlane Washington North FIPS 4601 Feet

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North Boeing Field
Seattle, Washington

TPH and PCB Results Adjacent to GTSP Fuel Tank Area

Figure 2

Y:\Projects\025082\212.005\MapDocs\Interim Action Fenceline Excavation Completion Report\Figure3ComprehensivePCBFencelineExcavationAreas.mxd 8/15/2012 NAD 1983 StatePlane Washington North FIPS 4601 Feet

Legend

- < 0.5 ppm Total PCBs in Area of Groundwater Contamination or < 1 ppm in Area of No GW Contamination
- > 1 ppm Total PCBs in Area of No Groundwater Contamination or > 0.5 ppm in Area of GW Contamination
- ≥ 50 ppm Total PCBs
- 2 Represents Bottom of Depth Interval where PCBs were Detected Above IAL
- North Lateral Storm Drain
- NBF Lease Property Line
- Seattle City Light Property Boundary (from City of Seattle, 2010)
- Non-TSCA 2011 Excavation
- TSCA 2011 Excavation
- Approximate Boundary of Groundwater with PCBs ≥ 0.03 µg/L

Notes

1. Includes sample locations representing soil removed during Interim Action excavation activities.
2. Black and white reproduction of this color original may reduce its effectiveness and lead to incorrect interpretation.

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0 20 40
Scale in Feet

North Boeing Field
Seattle, Washington

Soil PCB Data and Fenceline Excavation Areas

Figure 3

Y:\Projects\025082\212.005\MapDocs\Interim Action Fenceline Excavation Completion Report\Figure4FencelineAreaExcavationPCBs.mxd 8/15/2012 NAD 1983 StatePlane Washington North FIPS 4601 Feet

N

3-323

IAFE-S18
5/19/2011
5-6 ft
PCB Total:<0.031
7-8 ft
PCB Total:<0.032

IAFE-S17
5/19/2011
5-6 ft
PCB Total:<0.032
7-8 ft
PCB Total:<0.032

IAFE-S16
5/19/2011
5-6 ft
PCB Total: 0.076
7-8 ft
PCB Total:<0.032

IAFE-S15
5/19/2011
5-6 ft
PCB Total: 0.16
7-8 ft
PCB Total:<0.030

IAFE-S14
5/19/2011
5-6 ft
PCB Total: 11
7-8 ft
PCB Total:<0.031

IAFE-S13
5/19/2011
5-6
PCB Total: 3.5
7-8
PCB Total:<0.030

IAFE-S12
5/19/2011
5-6 ft
PCB Total: 340
7-8 ft
PCB Total:<0.031

IAFE-S11
5/20/2011
4-5 ft
PCB Total: 56
7-8 ft
PCB Total:<0.032

IAFE-S09
5/20/2011
5-6 ft
PCB Total: 10.4
7-8 ft
PCB Total:<0.032

NGW501
8/24/2010
0-2 ft
PCB Total: 18
2-4 ft
PCB Total: 8.9
4-6 ft
PCB Total: 2.1
6-8 ft
PCB Total:<0.001
8-10 ft
PCB Total: 0.05
10-12 ft
PCB Total:<0.001
12-14 ft
PCB Total:<0.001
14-15 ft
PCB Total:<0.001

3-331

IAFE-S10
5/20/2011
5-6 ft
PCB Total: 1.27
7-8 ft
PCB Total:<0.032

IAFE-S08
5/20/2011
5-6 ft
PCB Total: 14
7-8 ft
PCB Total: 0.22

LAI-SB-42
8/3/2010
0-2 ft
PCB Total: 264
2-4 ft
PCB Total: 560
4-6 ft
PCB Total: 100
6-8 ft
PCB Total: 0.037

NGW504
8/24/2010
0-2 ft
PCB Total: 64
2-4 ft
PCB Total: 156
4-6 ft
PCB Total: 104
6-8 ft
PCB Total: 11.5
8-10 ft
PCB Total: 52
10-12 ft
PCB Total: 0.039
12-14 ft
PCB Total: 0.041
14-15 ft
PCB Total: 0.12

3-332

LAI-SB-04
7/13/2010
0-2 ft
PCB Total: 5.4
2-4 ft
PCB Total: 0.47
4-6 ft
PCB Total: 0.108
6-8 ft
PCB Total:<0.001

IAFE-S02
5/19/2011
7-8 ft
PCB Total: 0.17

IAFE-S01
5/20/2011
8-9 ft
PCB Total: 0.26

IAFE-S06
5/20/2011
5-6 ft
PCB Total: 25.9
7-8 ft
PCB Total: 11.7
11-12 ft
PCB Total:<0.032

IAFE-S04
5/20/2011
7-7.5
PCB Total:<0.031

LAI-SB-07
7/14/2010
0-2 ft
PCB Total: 3.2
2-4 ft
PCB Total: 640
4-6 ft
PCB Total: 2300
6-8 ft
PCB Total: 0.26

IAFE-S05
5/20/2011
7-8 ft
PCB Total:<0.032

IAFE-S03
5/19/2011
8-9 ft
PCB Total:<0.032
10.5-11.5 ft
PCB Total:<0.032

LAI-SB-46
8/3/2010
0-2 ft
PCB Total: 320
2-4 ft
PCB Total: 0.105
4-6 ft
PCB Total: 1.79
6-8 ft
PCB Total:<0.032

CONFIRM-1
8/9/2011
2.0-2.5 ft
PCB Total:<0.001
2.5-3.0 ft
PCB Total: 0.107

IAFE-C03-B
8/29/2011
2.0 ft
PCB Total:<0.001

IAFE-C04-B
8/29/2011
1.5 ft
PCB Total:<0.001

NGW507
1/21/2011
0-2 ft
PCB Total: 0.79
2-4 ft
PCB Total: 0.143
4-6 ft
PCB Total:<0.001
6-8 ft
PCB Total:<0.001
8-10 ft
PCB Total:<0.001
10-12 ft
PCB Total:<0.001
12-14 ft
PCB Total:<0.001
14-15 ft
PCB Total:<0.001

NGW502
8/24/2010
0-2 ft
PCB Total: 48
2-4 ft
PCB Total: 61
4-6 ft
PCB Total: 520
6-8 ft
PCB Total: 211
8-10 ft
PCB Total: 223
10-12 ft
PCB Total: 0.097
12-14 ft
PCB Total: 0.14
14-15 ft
PCB Total: 0.07

NGW503
8/24/2010
0-2 ft
PCB Total: 1.6
2-4 ft
PCB Total:<0.001
4-6 ft
PCB Total: 0.12
6-8 ft
PCB Total:<0.001
8-10 ft
PCB Total: 0.11
10-12 ft
PCB Total:<0.001
12-14 ft
PCB Total:<0.001
14-15 ft
PCB Total:<0.001

3-326

LAI-SB-39
8/3/2010
0-2 ft
PCB Total: 1.05
2-4 ft
PCB Total:<0.031
4-6 ft
PCB Total:<0.031
6-8 ft
PCB Total:<0.031

IAFE-C05-B
8/29/2011
1.5 ft
PCB Total:<0.001

Legend

- North Lateral Storm Drain
- NBF Lease Property Line
- Seattle City Light Property Boundary (from City of Seattle, 2010)
- IAFE Confirmation Sample Locations
- Historic Confirmation Sample Locations
- Approximate Boundary of Groundwater with PCBs ≥ 0.03 µg/L

IAFE-S04 — Sample ID
6/3/2011 — Date
7-7.5ft — Sample Depth
PCB Total: <0.031 — Concentrations Reported in mg/kg

0 20 40
Scale in Feet

Notes

1. Grey text indicates that sample represents soil that was removed during excavation activities.
2. Black and white reproduction of this color original may reduce its effectiveness and lead to incorrect interpretation.

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North Boeing Field
Seattle, Washington

Fenceline Area Excavation Confirmation Soil Sample PCB Results

Figure 4

Y:\Projects\025082\212.002\MapDocs\Fenceline Excavation\Figure5-GTSPSiteConstructionFeatures.mxd 4/17/2012 NAD 1983 StatePlane Washington North FIPS 4601 Feet

Legend

- GTSP/NBF Site Haul Route
- Approximate Truck Wash Location
- Temporary Fence
- Temporary Water Treatment System
- Temporary Construction Office
- Temporary TSCA Decant Cell Location
- GTSP/NBF Site Boundary

0 125 250

Scale in Feet

Data Source: Integral Consulting Inc.

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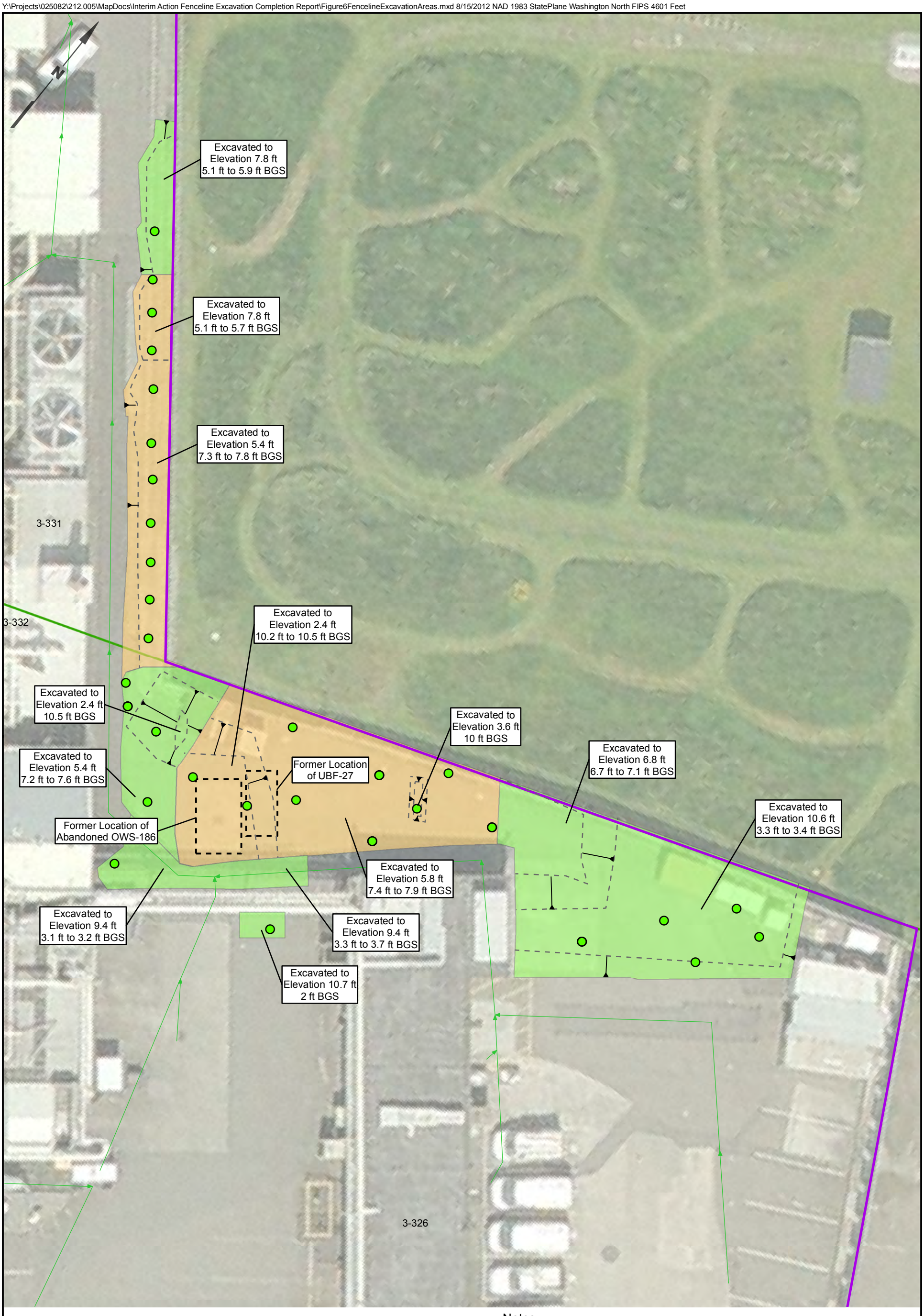
North Boeing Field
Seattle, Washington

GTSP/NBF Interim Action Construction Features

Figure 5

Y:\Projects\025082\212.005\MapDocs\Interim Action Fenceline Excavation Completion Report\Figure6FencelineExcavationAreas.mxd 8/15/2012 NAD 1983 StatePlane Washington North FIPS 4601 Feet



Legend

- North Lateral Storm Drain
- Non-TSCA 2011 Excavation
- TSCA 2011 Excavation
- Cut Lines
- Seattle City Light Property Boundary (from City of Seattle, 2010)
- Approximate Location of Confirmation Sample, Soil Remaining in place ≤ 0.5 mg/kg
- Property Line

Notes

1. Elevations in NAVD88.
2. Black and white reproduction of this color original may reduce its effectiveness and lead to incorrect interpretation.

0 20 40

Scale in Feet

LANDAU ASSOCIATES

North Boeing Field
Seattle, Washington

Fenceline Excavation Areas, Depths, and Confirmation Soil Samples Remaining in Place

Figure 6

Y:\Projects\025082\212.002\MapDocs\Fenceline Excavation\Figure7FencelineAirQualityMonitoringLocations.mxd 4/18/2012 NAD 1983 StatePlane Washington North FIPS 4601 Feet

Legend

- North Lateral Storm Drain
- Area Excavated on 9/1/2011
- Area Excavated on 9/6/2011
- NBF Lease Property Line
- Seattle City Light Property Boundary (from City of Seattle, 2010)
- Air Monitoring Locations

Notes

1. Elevations in NAVD88.
2. Black and white reproduction of this color original may reduce its effectiveness and lead to incorrect interpretation.

0 20 40

Scale in Feet

LANDAU ASSOCIATES

North Boeing Field
Seattle, Washington

Fenceline Area Excavation
Air Quality Monitoring Locations

Figure
7

TABLE 1
SOIL ANALYTICAL RESULTS
FENCELINE AREA INTERIM ACTION EXCAVATION PROJECT
NORTH BOEING FIELD

	IAFE-S01(8-9) SX81H 05/20/2011	IAFE-S02(7-8) SX65A 05/19/2011	IAFE-S03(8-9) SX65E 05/19/2011	IAFE-S03(10.5-11.5) SX65F 05/19/2011	IAFE-S04(7-7.5) SX81F 05/20/2011	IAFE-S05(7-8) SX81D 05/20/2011	IAFE-S06(5-6) (a) SX81A 05/20/2011	IAFE-S06(7-8) (a) SX81B 05/20/2011	IAFE-S06(11-12) SZ34A 05/20/2011
PCBs (mg/kg)									
Method SW8082									
Aroclor 1016	0.033 U	0.032 U	0.032 U	0.032 U	0.031 U	0.032 U	0.96 U	0.62 U	0.032 U
Aroclor 1242	0.033 U	**0.12**	0.032 U	0.032 U	0.031 U	0.032 U	0.96 U	0.62 U	0.032 U
Aroclor 1248	**0.16**	0.032 U	0.032 U	0.032 U	0.16 U	0.032 U	**17**	**7.5**	0.032 U
Aroclor 1254	**0.1**	**0.05**	0.032 U	0.032 U	0.031 U	0.032 U	**8.9**	**4.2**	0.032 U
Aroclor 1260	0.033 U	0.032 U	0.032 U	0.032 U	0.031 U	0.032 U	0.96 U	0.62 U	0.032 U
Aroclor 1221	0.033 U	0.032 U	0.032 U	0.032 U	0.031 U	0.032 U	0.96 U	0.62 U	0.032 U
Aroclor 1232	0.033 U	0.032 U	0.032 U	0.032 U	0.031 U	0.032 U	0.96 U	0.62 U	0.032 U
Total PCBs	**0.26**	**0.17**	ND	ND	ND	ND	**25.9**	**11.7**	ND
TOTAL PETROLEUM HYDROCARBONS (mg/kg)									
NWTPH-Dx									
Diesel-Range Organics	**12**	6.1 U	6.0 U	**9.5**	6.2 U	NA	**31**	**19**	6.4 U
Lube Oil	12 U	12 U	12 U	13 U	12 U	NA	**63**	**37**	13 U
NWTPH-Gx									
Gasoline-Range Organics	**24**	6.6 U	7.2 U	8.1 U	7.6 U	NA	6.7 U	7.0 U	NA

TABLE 1
SOIL ANALYTICAL RESULTS
FENCELINE AREA INTERIM ACTION EXCAVATION PROJECT
NORTH BOEING FIELD

	IAFE-S08(5-6) (a) SX81J 05/20/2011	IAFE-S08(7-8) SX81K 05/20/2011	IAFE-S09(5-6) (a) SX81M 05/20/2011	IAFE-S09(7-8) SX81N 05/20/2011	IAFE-S10(5-6) (a) SX81O 05/20/2011	IAFE-S10(7-8) SX81P 05/20/2011	IAFE-S11(4-5) (a) SX81Q 05/20/2011	IAFE-S11(7-8) SX81R 05/20/2011	IAFE-S12(5-6) (a) SX66I 05/19/2011
PCBs (mg/kg)									
Method SW8082									
Aroclor 1016	7.8 U	0.031 U	0.31 U	0.032 U	0.032 U	0.032 U	1.2 U	0.032 U	39 U
Aroclor 1242	7.8 U	0.031 U	0.31 U	0.064 U	**0.46**	0.032 U	1.2 U	0.032 U	39 U
Aroclor 1248	39 U	0.16 U	**5.5** J	0.032 U	0.032 U	0.032 U	18 U	0.032 U	160 U
Aroclor 1254	**14**	**0.22**	**4.9** J	0.032 U	**0.81**	0.032 U	**56**	0.032 U	**340**
Aroclor 1260	7.8 U	0.031 U	0.46 U	0.032 U	0.064 U	0.032 U	6 U	0.032 U	39 U
Aroclor 1221	7.8 U	0.031 U	0.31 U	0.032 U	0.032 U	0.032 U	1.2 U	0.032 U	39 U
Aroclor 1232	7.8 U	0.031 U	0.31 U	0.032 U	0.032 U	0.032 U	1.2 U	0.032 U	39 U
Total PCBs	**14**	**0.22**	**10.4**	ND	**1.27**	ND	**56**	ND	**340**
TOTAL PETROLEUM HYDROCARBONS (mg/kg)									
NWTPH-Dx									
Diesel-Range Organics	NA	NA	NA	NA	NA	NA	NA	NA	NA
Lube Oil	NA	NA	NA	NA	NA	NA	NA	NA	NA
NWTPH-Gx									
Gasoline-Range Organics	NA	NA	NA	NA	NA	NA	NA	NA	NA

TABLE 1
SOIL ANALYTICAL RESULTS
FENCELINE AREA INTERIM ACTION EXCAVATION PROJECT
NORTH BOEING FIELD

	IAFE-S12(7-8) SX66J 05/19/2011	IAFE-S13(5-6) (a) SX66G 05/19/2011	IAFE-S13(7-8) SX66H 05/19/2011	IAFE-S14(5-6) (a) SX66E 05/19/2011	IAFE-S14(7-8) SX66F 05/19/2011	IAFE-S15(5-6) (a) SX66C 05/19/2011	IAFE-S15(7-8) SX66D 05/19/2011	IAFE-S16(5-6) (a) SX66A 05/19/2011	IAFE-S16(7-8) SX66B 05/19/2011
PCBs (mg/kg)									
Method SW8082									
Aroclor 1016	0.031 U	1.9 U	0.030 U	1.7 U	0.031 U	0.031 U	0.030 U	0.031 U	0.032 U
Aroclor 1242	0.031 U	1.9 U	0.030 U	1.7 U	0.031 U	0.031 U	0.030 U	0.031 U	0.032 U
Aroclor 1248	0.031 U	2.6 U	0.030 U	6.2 U	0.031 U	0.046 U	0.030 U	0.031 U	0.032 U
Aroclor 1254	0.031 U	**3.5**	0.030 U	**11**	0.031 U	**0.16**	0.030 U	**0.076**	0.032 U
Aroclor 1260	0.031 U	1.9 U	0.030 U	4.3 U	0.031 U	0.052 U	0.030 U	0.031 U	0.032 U
Aroclor 1221	0.031 U	1.9 U	0.030 U	1.7 U	0.031 U	0.031 U	0.030 U	0.031 U	0.032 U
Aroclor 1232	0.031 U	1.9 U	0.030 U	1.7 U	0.031 U	0.031 U	0.030 U	0.031 U	0.032 U
Total PCBs	ND	**3.5**	ND	**11**	ND	**0.16**	ND	**0.076**	ND
TOTAL PETROLEUM HYDROCARBONS (mg/kg)									
NWTPH-Dx									
Diesel-Range Organics	NA	NA	NA	NA	NA	NA	NA	NA	NA
Lube Oil	NA	NA	NA	NA	NA	NA	NA	NA	NA
NWTPH-Gx									
Gasoline-Range Organics	NA	NA	NA	NA	NA	NA	NA	NA	NA

TABLE 1
SOIL ANALYTICAL RESULTS
FENCELINE AREA INTERIM ACTION EXCAVATION PROJECT
NORTH BOEING FIELD

	IAFE-S17(5-6) (a) SX65O 05/19/2011	IAFE-S17(7-8) SX65P 05/19/2011	IAFE-S18(5-6) SX65M 05/19/2011	IAFE-S18(7-8) SX65N 05/19/2011	IAFE-S19(7-8) SX65K 05/19/2011	IAFE-S19(11-12) SX65L 05/19/2011	IAFE-S20(7-8) SX65I 05/19/2011	IAFE-S20(11-12) SX65J 05/19/2011	IAFE-S21(7-8) SX65H 05/19/2011
PCBs (mg/kg)									
Method SW8082									
Aroclor 1016	0.032 U	0.032 U	0.031 U	0.032 U	0.032 U	0.031 U	0.031 U	0.032 U	0.031 U
Aroclor 1242	0.032 U	0.032 U	0.031 U	0.032 U	0.032 U	0.031 U	0.031 U	0.032 U	0.031 U
Aroclor 1248	0.032 U	0.032 U	0.031 U	0.032 U	0.032 U	0.031 U	0.031 U	0.032 U	0.031 U
Aroclor 1254	0.032 U	0.032 U	0.031 U	0.032 U	0.032 U	0.031 U	0.031 U	0.032 U	0.031 U
Aroclor 1260	0.032 U	0.032 U	0.031 U	0.032 U	0.032 U	0.031 U	0.031 U	0.032 U	0.031 U
Aroclor 1221	0.032 U	0.032 U	0.031 U	0.032 U	0.032 U	0.031 U	0.031 U	0.032 U	0.031 U
Aroclor 1232	0.032 U	0.032 U	0.031 U	0.032 U	0.032 U	0.031 U	0.031 U	0.032 U	0.031 U
Total PCBs	ND	ND	ND	ND	ND	ND	ND	ND	ND
TOTAL PETROLEUM HYDROCARBONS (mg/kg)									
NWTPH-Dx									
Diesel-Range Organics	NA	NA	NA	NA	6.7 U	6.4 U	6.9 U	6.4 U	6.2 U
Lube Oil	NA	NA	NA	NA	13 U	13 U	14 U	13 U	12 U
NWTPH-Gx									
Gasoline-Range Organics	NA	NA	NA	NA	9.0 U	8.5 U	9.5 U	8.9 U	7.4 U

TABLE 1
SOIL ANALYTICAL RESULTS
FENCELINE AREA INTERIM ACTION EXCAVATION PROJECT
NORTH BOEING FIELD

	IAFE-S22(7-8) SX65G 05/19/2011	IAFE-S23(7-8) SX65D 05/19/2011	IAFE-S24(7-8) SX65C 05/19/2011	CONFIRM-1 (2.0-2.5) (a) TH83A 08/09/2011	CONFIRM-1 (2.5-3.0) TH83B 08/09/2011	IAFE-C03-B TK27A 08/29/2011	IAFE-C04-1.5 TK27B 08/29/2011	IAFE-C05-1.5 TK27C 08/29/2011
PCBs (mg/kg)								
Method SW8082								
Aroclor 1016	0.032 U	0.031 U	0.030 U	0.032 U	0.032 U	0.031 U	0.032 U	0.032 U
Aroclor 1242	0.032 U	0.031 U	0.030 U	0.032 U	0.032 U	0.031 U	0.032 U	0.032 U
Aroclor 1248	0.032 U	0.031 U	0.030 U	0.032 U	0.032 U	0.031 U	0.032 U	0.032 U
Aroclor 1254	0.032 U	0.031 U	0.030 U	0.032 U	**0.060**	0.031 U	0.032 U	0.032 U
Aroclor 1260	0.032 U	0.031 U	0.030 U	0.032 U	**0.047**	0.031 U	0.032 U	0.032 U
Aroclor 1221	0.032 U	0.031 U	0.030 U	0.032 U	0.032 U	0.031 U	0.032 U	0.032 U
Aroclor 1232	0.032 U	0.031 U	0.030 U	0.032 U	0.032 U	0.031 U	0.032 U	0.032 U
Total PCBs	ND	ND	ND	ND	**0.107**	ND	ND	ND
TOTAL PETROLEUM HYDROCARBONS (mg/kg)								
NWTPH-Dx								
Diesel-Range Organics	6.0 U	6.0 U	6.1 U	**370**	**38**	NA	NA	NA
Lube Oil	12 U	12 U	12 U	**1400**	**110**	NA	NA	NA
NWTPH-Gx								
Gasoline-Range Organics	6.8 U	8.4 U	7.3 U	6.6 U	13 U	NA	NA	NA

NA = Not Analyzed
U = Indicates the compound was undetected at the reported concentration.
J = Indicates the analyte was positively identified; the associated numerical value is the approximate concentration of the analyte in the sample.
Bold = Detected concentration.

(a) Detected concentration represents soil removed during excavation activities

TABLE 2
AIR ANALYTICAL RESULTS
FENCELINE AREA INTERIM ACTION EXCAVATION PROJECT
NORTH BOEING FIELD

	OAQ-EXC-01 P1103377-001 9/1/2011	OAQ-EXC-02 P1103377-002 9/1/2011	OAQ-EXC-03 P1103416-001 9/6/2011	OAQ-EXC-04 P1103416-002 9/6/2011
PCBs (ng/Cartridge)				
Method EPA TO-10A				
Aroclor 1016	500 U	500 U	500 U	500 U
Aroclor 1221	500 U	500 U	500 U	500 U
Aroclor 1232	500 U	500 U	500 U	500 U
Aroclor 1242	500 U	500 U	500 U	500 U
Aroclor 1248	500 U	500 U	500 U	500 U
Aroclor 1254	500 U	500 U	500 U	500 U
Aroclor 1260	500 U	500 U	500 U	500 U
Total PCBs	ND	ND	ND	ND
PCBs (µg/m³)				
Method EPA TO-10A				
Aroclor 1016	0.21 U	0.21 U	0.21 U	0.21 U
Aroclor 1221	0.21 U	0.21 U	0.21 U	0.21 U
Aroclor 1232	0.21 U	0.21 U	0.21 U	0.21 U
Aroclor 1242	0.21 U	0.21 U	0.21 U	0.21 U
Aroclor 1248	0.21 U	0.21 U	0.21 U	0.21 U
Aroclor 1254	0.21 U	0.21 U	0.21 U	0.21 U
Aroclor 1260	0.21 U	0.21 U	0.21 U	0.21 U
Total PCBs	ND	ND	ND	ND

ND = Not Detected.
U = Indicates the compound was undetected at the given reporting limit.